

WHAT IS CLAIMED IS:

1. A high frequency power amplifier module
comprising:

5 an input terminal adapted to be fed with a
signal to be amplified;
an output terminal;
a control terminal; and
a semiconductor amplification element including:
10 a source; a drain for outputting a signal to said
output terminal; and a first gate and a second gate
between said drain and said source, said first gate
being closer to said drain for receiving the signal
from said control terminal, and said second gate being
15 closer to said source for receiving the signal from
said input terminal.

2. A high frequency power amplifier module
according to Claim 1,

20 wherein said semiconductor amplification element
is a dual gate type semiconductor amplification
element.

3. A high frequency power amplifier module
25 according to Claim 1,

wherein said high frequency power amplifier module is a high frequency power amplifier module for the GSM.

- 5 4. A high frequency power amplifier module according to Claim 1,

wherein said high frequency power amplifier module is a high frequency power amplifier module for the EDGE.

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5. A high frequency power amplifier module comprising:

an input terminal;
an output terminal;
15 a control terminal;

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a semiconductor amplification element including a first gate and a second gate between a drain and a source, said first gate being closer to said drain for receiving the signal from said control terminal, and
20 said second gate being closer to said source for receiving the signal from said input terminal;

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a circuit for feeding said output terminal with a signal according to the signal outputted from said semiconductor amplification element; and

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a bias circuit connected with said control

terminal for feeding the second gate of said semiconductor amplification element with a bias according to a control voltage fed to said control terminal.

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6. A high frequency power amplifier module according to Claim 5,

wherein said bias has non-linear characteristics.

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7. A high frequency power amplifier module according to Claim 6,

wherein said high frequency power amplifier module is a high frequency power amplifier module for the GSM.

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8. A high frequency power amplifier module according to Claim 7,

wherein both an FET acting at the first gate and an FET acting at the second gate of said dual gate FET exhibit linear voltage characteristics, and

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wherein the voltage characteristics of the FET acting at said first gate have a steeper gradient than that of the voltage characteristics of the FET acting at said second gate.

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9. A high frequency power amplifier module according to Claim 7,

5 wherein the bias voltage is so applied to said dual gate FET that an FET acting at the first gate of said dual gate FET acts quicker than an FET acting at said second gate and stops its actions slower than the FET acting at said second gate.

10 10. A high frequency power amplifier module comprising:

an input terminal;

an output terminal;

a control terminal;

15 a mode switching terminal;

a semiconductor amplification element including a first gate and a second gate between a drain and a source, said first gate being closer to said drain for receiving the signal from said control terminal, and
20 said second gate being closer to said source for receiving the signal from said input terminal;

a circuit for feeding said output terminal with a signal according to the signal outputted from the drain of said semiconductor amplification element;

25 a bias circuit connected with said control

terminal for feeding the second gate of said semiconductor amplification element with a bias according to a control voltage fed to said control terminal; and

5 a mode switching circuit activated in response to the signal from said mode switching terminal to feed an output signal to the second gate of said semiconductor amplification element.

10 11. A high frequency power amplifier module according to Claim 10,

 wherein said circuit disposed between said semiconductor amplification element and said output circuit includes one or more cascade-connected second
15 semiconductor amplification elements, and

 wherein said second semiconductor amplification element includes: a control terminal connected with the output terminal of the upstream stage semiconductor amplification element; and a first
20 terminal connected with either said output terminal or the downstream stage semiconductor amplification element.

12. A high frequency power amplifier module
25 according to Claim 11, further comprising:

an AGC circuit for feeding its output to the first gate of said semiconductor amplification element.

5 13. A high frequency power amplifier module according to Claim 10,

wherein said high frequency power amplifier module is an amplifier system for the GSM, when the output signal of said mode switching circuit exhibits
10 a first state, and an amplifier system for the EDGE when the output signal of said mode switching circuit exhibits a second state.

14. A high frequency power amplifier module
15 comprising:

an input terminal;
an output terminal;
a control terminal;
a mode switching terminal;

20 a semiconductor amplification element including a first gate and a second gate between a drain and a source, said first gate being closer to said drain for receiving the signal from said control terminal, and said second gate being closer to said source for
25 receiving the signal from said input terminal;

a circuit for feeding said output terminal with a signal according to the signal outputted from the drain of said semiconductor amplification element;

5 a bias circuit connected with said control terminal for feeding the first gate and the second gate of said semiconductor amplification element with a bias according to a control voltage fed to said control terminal; and

10 a mode switching circuit activated in response to the signal from said mode switching terminal to feed an output signal to the second gate of said semiconductor amplification element.

15 15. A high frequency power amplifier module according to Claim 14,

wherein said high frequency power amplifier module is an amplifier system for the GSM, when the output signal of said mode switching circuit exhibits a first state, and an amplifier system for the EDGE
20 when the output signal of said mode switching circuit exhibits a second state.

16. A wireless communication system comprising a high frequency power amplifier module at the output
25 stage on a transmission side,

wherein said high frequency power amplifier module includes:

an input terminal adapted to be fed with a signal to be amplified;

5 an output terminal;

a control terminal; and

a semiconductor amplification element including:
a source; a drain for outputting a signal to said output terminal; and a first gate and a second gate
10 between said drain and said source, said first gate being closer to said drain for receiving the signal from said control terminal, and said second gate being closer to said source for receiving the signal from said input terminal.

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17. A wireless communication system according to Claim 16,

wherein said semiconductor amplification element is a dual gate type semiconductor amplification
20 element.

18. A wireless communication system according to Claim 16,

wherein said high frequency power amplifier
25 module is a high frequency power amplifier module for

the GSM.

19. A wireless communication system according to
Claim 16,

5 wherein said high frequency power amplifier
module is a high frequency power amplifier module for
the EDGE.

20. A wireless communication system comprising a
10 high frequency power amplifier module at the output
stage on a transmission side,

 wherein said high frequency power amplifier
module includes:

 an input terminal;

15 an output terminal;

 a control terminal;

 a semiconductor amplification element including
a first gate and a second gate between a drain and a
source, said first gate being closer to said drain for
20 receiving the signal from said control terminal, and
said second gate being closer to said source for
receiving the signal from said input terminal;

 a circuit for feeding said output terminal with a
signal according to the signal outputted from said
25 semiconductor amplification element; and

a bias circuit connected with said control terminal for feeding the second gate of said semiconductor amplification element with a bias according to a control voltage fed to said control
5 terminal.

21. A wireless communication system according to Claim 20,

wherein said bias has non-linear
10 characteristics.

22. A wireless communication system according to Claim 20,

wherein said high frequency power amplifier
15 module is a high frequency power amplifier module for the GSM.

23. A wireless communication system according to Claim 22,

20 wherein both an FET acting at the first gate and an FET acting at the second gate of said dual gate FET exhibit linear voltage characteristics, and

wherein the voltage characteristics of the FET acting at said first gate have a steeper gradient than
25 that of the voltage characteristics of the FET acting

at said second gate.

24. A wireless communication system according to Claim 22,

5 wherein the bias voltage is so applied to said dual gate FET that an FET acting at the first gate of said dual gate FET acts quicker than an FET acting at said second gate and stops its actions slower than the FET acting at said second gate.

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25. A wireless communication system comprising a high frequency power amplifier module at the output stage on a transmission side,

 wherein said high frequency power amplifier
15 module includes:

 an input terminal;
 an output terminal;
 a control terminal;
 a mode switching terminal;

20 a semiconductor amplification element including a first gate and a second gate between a drain and a source, said first gate being closer to said drain for receiving the signal from said control terminal, and said second gate being closer to said source for
25 receiving the signal from said input terminal;

a circuit for feeding said output terminal with a signal according to the signal outputted from the drain of said semiconductor amplification element;

a bias circuit connected with said control
5 terminal for feeding the second gate of said semiconductor amplification element with a bias according to a control voltage fed to said control terminal; and

a mode switching circuit activated in response
10 to the signal from said mode switching terminal to feed an output signal to the second gate of said semiconductor amplification element.

26. A wireless communication system according to
15 Claim 25,

wherein said circuit disposed between said semiconductor amplification element and said output circuit includes one or more cascade-connected second semiconductor amplification elements, and

20 wherein said second semiconductor amplification element includes: a control terminal connected with the output terminal of the upstream stage semiconductor amplification element; and a first terminal connected with either said output terminal or
25 the downstream stage semiconductor amplification

element.

27. A wireless communication system according to Claim 26, further comprising:

5 an AGC circuit for feeding its output to the first gate of said semiconductor amplification element.

28. A wireless communication system according to Claim 25,

10 wherein said high frequency power amplifier module acts as an amplification module for the GSM, when the output signal of said mode switching circuit exhibits a first state, and an amplification module
15 for the EDGE when the output signal of said mode switching circuit exhibits a second state.

29. A wireless communication system comprising a high frequency power amplifier module at the output
20 stage on a transmission side,

 wherein said high frequency power amplifier module includes:

 an input terminal;
 an output terminal;
25 a control terminal;

a mode switching terminal;

a semiconductor amplification element including
a first gate and a second gate between a drain and a
source, said first gate being closer to said drain for
5 receiving the signal from said control terminal, and
said second gate being closer to said source for
receiving the signal from said input terminal;

a circuit for feeding said output terminal with a
signal according to the signal outputted from the
10 drain of said semiconductor amplification element;

a bias circuit connected with said control
terminal for feeding the first gate and the second
gate of said semiconductor amplification element with
a bias according to a control voltage fed to said
15 control terminal; and

a mode switching circuit activated in response
to the signal from said mode switching terminal to
feed an output signal to the second gate of said
semiconductor amplification element.

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30. A wireless communication system according to
Claim 29,

wherein said high frequency power amplifier
module acts as an amplification module for the GSM,
25 when the output signal of said mode switching circuit

exhibits a first state, and an amplification module for the EDGE when the output signal of said mode switching circuit exhibits a second state.

5 31. A high frequency power amplifier module comprising:

 an input terminal adapted to be fed with a signal to be amplified;

 an output terminal;

10 a control terminal;

 a mode switching terminal;

 a semiconductor element including: a source; a drain for outputting a signal to be transmitted to said output terminal; a first gate being disposed
15 closer to said drain; and a second gate disposed closer to said source and adapted to be fed with the signal from said input terminal; and

 a control circuit for receiving a signal from said control terminal and a signal from said mode
20 switching terminal to feed a bias voltage to said first gate and said second gate.

32. A high frequency power amplifier module according to Claim 31,

25 wherein in response to the signal from said mode

switching terminal, said control circuit generates the bias voltage so that said semiconductor element may act in a linear action region or in a non-linear action region.

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33. A high frequency power amplifier module according to claim 32,

wherein said semiconductor element is a dual gate FET.

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34. A wireless communication system comprising: an antenna; and a high frequency power amplifier module for feeding its output to said antenna,

wherein said high frequency power amplifier module includes:

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an input terminal adapted to be fed with a signal to be amplified;

an output terminal;

a control terminal;

20 a mode switching terminal;

a semiconductor element including: a source; a drain for outputting a signal to be transmitted to said output terminal; a first gate being disposed closer to said drain; and a second gate disposed
25 closer to said source and adapted to be fed with the

signal from said input terminal; and

a control circuit for receiving a signal from
said control terminal and a signal from said mode
switching terminal to feed a bias voltage to said
5 first gate and said second gate.

35. A wireless communication system according to
Claim 34,

10 wherein in response to the signal from said mode
switching terminal, said control circuit generates the
bias voltage so that said semiconductor element may
act in a linear action region or in a non-linear
action region.

15 36. A wireless communication system according to
Claim 35,

wherein said semiconductor element is a dual
gate FET.